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GAINING ENTREPRENEURSHIP SKILLS WITH THE ACTIVITIES DESIGNED RELATED TO PRIMARY SCHOOL MATHEMATICS CURRICULUM: THE CASE OF TURKEY

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Abstract: The aim of this study is to gain entrepreneurship skills with activities in mathematics education. With this aim, the Primary School Mathematics Curriculum was examined by the researchers. In this process, data were collected using a document review form developed by the researchers within the framework of Tarhan (2019a). According to this framework, entrepreneurship education includes five dimensions, namely business idea, finance, product design and production, promotion and marketing, investment. Obtained data was analyzed by document analysis method. Through the analysis process, the objectives of the program related to the entrepreneurial skills were determined and the activities were designed in line with these objectives. As a result, it was determined that the activities prepared in order to gain entrepreneurship skills in the Primary School Mathematics Curriculum were not compatible with each grade level and each learning domain. This suggests that some of the objectives are not compatible for gaining entrepreneurship skills. Therefore, any activities could be designed related to objectives and learning domains at some of the grade levels. Moreover, it was also found that there were any studies in mathematics education involving the creation and application of mathematical activities by addressing entrepreneurship elements systematically (dimension, subject, skill, value).

Key words: entrepreneurship, mathematics education, primary school

1. Introduction

The entrepreneurship is related to awareness, ideas, imagination and economic effort. Entrepreneurship debate in the world, especially in Europe, has been dealt with as an issue on the axis of history and culture, and the view that entrepreneurship will gain a more innovative ground from the dialogues between European states has prevailed (Tarhan, 2019a). Accordingly, entrepreneurship education aiming to increase entrepreneurial activities is transferred to individuals within the context of each country's unique cultural context (Lee & Peterson, 2000). In this sense, when the entrepreneurship education practices in different countries are examined, it is seen that entrepreneurship education starts from primary schools in the USA and students are introduced to entrepreneurship and entrepreneurship education before they reach high school level. In Japan, however, entrepreneurship education has been started in high schools since 2001 (in Tokyo). Entrepreneurship training, which started in colleges in Korea, became widespread and supported by various entrepreneurship education courses. In our country, on the other hand, entrepreneurship skill is included in all programs implemented since 2005 as a basic skill (Ministry of National Education [MoNE], 2015, 2018). Based on this approach, it can be said that MoNE aims to teach entrepreneurship skills in an interdisciplinary way. Therefore, it is seen that entrepreneurship skills are among the common skills that should be gained in the curriculum.

Gartner (1988) adopted entrepreneurship as a behavioral approach and expressed entrepreneurship as the role that individuals assume for establishing an organization. Moreover, it is possible to define entrepreneurship pedagogically as the ability to provide finance resources to produce the business idea arising from awareness of opportunities, produce and market the product or service, and provide

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investment opportunities. It is considered that a certain educational process is necessary for students to acquire the expressions in this definition. This process can be described as entrepreneurship education in general (Tarhan, 2019a).

The rising global economic competition in the 21st century has led to an increase in interest in entrepreneurship and increase of resources and funds allocated. This remarkable development has attracted the attention of academicians; has enabled studies on the impact and efficiency of entrepreneurship and about the best practices for teaching entrepreneurship. From this point of view, entrepreneurship education has gained importance and appeared as a discipline "to provide students with entrepreneurial awareness, understanding about the importance of entrepreneurship in economic terms and both business idea and transferable skills about how to start and continue a successful entrepreneurial process based on transfer of past experiences, the formation of new initiatives by means of trial and error method and the development of knowledge" (Kirby, 2007).

The aim of entrepreneurship education is to provide appearance of a person's hidden features regarding the potential of entrepreneurship and awareness about these features. On the other hand, in entrepreneurship education, it is aimed to minimize errors of individuals during the activity of the enterprise, prevent them from making errors in their work and ensure that their resources are used more efficiently (Balaban & Özdemir, 2008; Çetinkaya Bozkurt, 2011). According to many countries as Turkey, incorporating entrepreneurship education into primary education and gaining entrepreneurship skills with an interdisciplinary approach through this education process, on the other hand, the goals of entrepreneurship education can be expressed in different forms within the curriculum and between programs, rather than being clearly a part of a particular topic.

Mathematics education is one of the disciplines that have important learning domains and objectives in gaining entrepreneurship skills. However, when the Primary School Mathematics Curriculum was examined, it was found that there were deficiencies in gaining entrepreneurship skills within the program. Moreover, it draws attention that the lack of studies related to the development of entrepreneurial skills in mathematics education in Turkey. Thus, in this study, it is aimed to overcome this deficiency and gain entrepreneurship skills through activities in line with the Primary School Mathematics Curriculum. This research, which aims to gain entrepreneurship skills through activities, has been prepared within the scope of five dimensions including the categorization of the elements of entrepreneurship education (Tarhan, 2019a, 2019b). These dimensions can be expressed as: business idea, finance, product design-production, promotion and marketing, investment. For this purpose, the research questions were determined as below:

- What are the sample objectives and activities for developing entrepreneurial skills in the business idea dimension?
- What are the sample objectives and activities for developing entrepreneurial skills in the finance dimension?
- What are the sample objectives and activities for developing entrepreneurial skills in the product design-production dimension?
- What are the sample objectives and activities for developing entrepreneurial skills in the promotion and marketing dimension?
- What are the sample objectives and activities for developing entrepreneurial skills in the investment dimension?

2. Methodology

2. 1. Research design

The method of the study is case study which is a qualitative research design. Case studies are carried out in various forms. An individual, an institution, a group, an environment can be an example for the situations to be studied in case study (Yıldırım & Şimşek, 2013). In such studies, it is aimed to reveal the results of a particular situation. In addition, the main feature of the case study is in-depth investigation of one or more cases. In this study, it is aimed to investigate the Primary School Mathematics Curriculum according to dimensions of entrepreneurship education.

2. 2. Data collection

In this research, current Primary and Elementary School Mathematics Curriculum prepared by the Ministry of National Education was used. However, since the study is aimed to examine the learning domains and objectives included in the Primary School Mathematics Curriculum, the second part of the curriculum related to elementary school was not included in the study.

Data were collected using a document review form developed by the researchers. Document review form prepared within the framework of entrepreneurship, entrepreneurship education, the elements of entrepreneurship education as Tarhan (2019a) stated and data were obtained in accordance with these criteria. Information on the elements of entrepreneurship education is given in Appendix. The examination of the Primary School Mathematics Curriculum with the help of the document review form and obtaining data were completed in one month (30 days).

2. 3. Data analysis

Data were analyzed by document analysis method. The method of document analysis involves the analysis of written materials that provide information on any subjects within the framework of certain criteria. In addition, document analysis can be used as a stand-alone research method or as an additional source of information where other qualitative methods are used (Yıldırım & Şimşek, 2013).

The Primary School Mathematics Curriculum was read several times by the researchers, and the objectives appropriate to the entrepreneurship skills were determined. Then, entrepreneurship activities were developed by taking grade levels and learning domains into consideration. This process was carried out by two researchers during all class levels and objectives. The researchers made explanations to each other and the final decision were taken together when they were in contradiction in determining objectives appropriate for the entrepreneurship skills. A similar process was carried out during the preparation of entrepreneurship activities in accordance with grade levels and learning domains. The activities designed accorging to each grade level and these entrepreneurship-related activities were examined by an independent third researcher. The final form of the activities were redesigned in accordance with the feedback obtained.

2. 4. Reliability and validity

In order to increase the validity and reliability of the research, some measures have been taken. For the internal validity of the study, the document review form was prepared by taking related literature into consideration. Integrity was ensured by checking the appropriateness of each activity in terms the grade levels and objectives. In order to increase the external validity of the research, the research model, data collection tool, data collection process, data collection-analysis and interpretation were explained in detail.

For the internal reliability of the study, on the other hand, the findings were presented directly with any comments. While determining the objectives appropriate to the entrepreneurship skills, the researchers read the Primary School Mathematics Curriculum separately and the percentage of agreement was calculated as 85% agreement among the researchers. Furthermore, the last situation was independently checked by the third researcher. In order to increase the external reliability of the research, the activities designed during the research process were described in detail.

3. Findings

Obtained findings were evaluated according to research questions and presented under related categories. The findings were interpreted according to five dimensions of entrepreneurship education, namely business idea, finance, product design and production, promotion-marketing and investment

3.1. Evaluation of Primary School Mathematics Curriculum according to business idea dimension of entreneurship education

The activities aimed to gain entrepreneurship skills in the Primary School Mathematics Curriculum were developed according to the dimensions of entrepreneurship education and the business idea among these dimensions was discussed first. Formation of business idea is one of the most important

steps in realizing an entrepreneurial activity. The business idea can be expressed as the product of the necessary efforts and ideas about what can be done before starting any business. It is considered important to gain the skills that will contribute to the formation of entrepreneurial idea in terms of education programs (Tarhan, 2019a). Therefore, taking the objectives of the Primary School Mathematics Curriculum into the consideration, in order to gain the aimed skills in the entrepreneurship education with the activities, the sample activities developed related to the sub-skills of entrepreneurship education were given in related tables according to the grade levels.

At the first step, the objectives of first grade were investigated and it was found that 3 learning domains (numbers-operations, measurement and data analysis) and 3 objectives that can be facilitated to develop entrepreneurship skills related to business idea. In line with these findings, in order to gain the sub-skills of the business idea theme (workplace design skill, work plan skill, comprehending difference skill), sample activities were designed in accordance with these objectives by taking developmental processes and grade levels of the students into consideration. Three objectives and related activities were given in Table 1 below.

Table 1. *The first grade's objectives and activities related to the business idea theme*

<table>
<tr><th>Learning Domain/ Objectives</th><th>Sample Entrepreneurship Skills/ Sample</th></tr>
<tr><td>M.1.2.2. Spatial relations
Terms or concepts: congruent figures

M.1.2.2.1 Express spatial (position, location, direction) relations.
a) Activities are conducted for studying the expressions (under-above, around-left-right-between- in front of-behind, high-low, far-soon, inside-outside) in daily life situations.</td><td><u>Workplace Design Skill/ Sample Activity</u>
 
Which area of the school in the picture is suitable for opening a stationery shop?
a) Right b) Across (the road) c) Far away from the school</td></tr>
<tr><td>M.1.3.3. Time Measurement
Terms or concepts: month, week, day, hour

M.1.3.3.1. Tells half and an hour.
a) Only analog clocks are used.
b) Shows the hours of certain activities during the day. For example, breakfast, lunch, dinner, sleep time, start and end of school time, etc. are studied related to 12 hours</td><td><u>Business Plan Skill/ Sample Activity</u>
What time should Ali be at home after lego design between the hours of 8 and 9 in the evening?

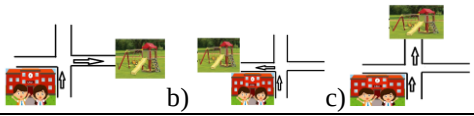
a) b) c)
  </td></tr>
<tr><td>M.1.4.1. Data Collection and Evaluation
Terms or concepts: table, data

M.1.4.1.1. Reads simple tables with up to two data groups.
a) Students are taught tables that they frequently encounter or use such as daily nutrition tables in school and calendars.</td><td><u>Comprehending Difference Skill/ Sample Activity</u>
Find the correct answer according to the table below.

The Number of Pens used by Girls and Boys
<table><tr><th>Students
Color of pen</th><th>Girls</th><th>Boys</th></tr><tr><td>Red pen</td><td>10</td><td>2</td></tr><tr><td>Blue pen</td><td>3</td><td>11</td></tr></table>a) Number of red pens that girls used were more than that of boys.
b) Number of blue pens that girls used were more than that of boys.
c) Boys and girls used same number of red and blue pens.</td></tr>
</table>

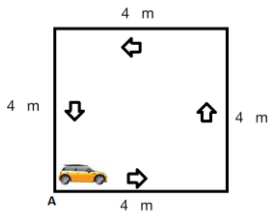
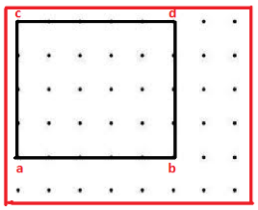
In the second grade, on the other hand, 2 learning domains (geometry and measurement) and 3 objectives that can be facilitated to develop entrepreneurship skills related to business idea were found. In line with these objectives, in order to gain the sub-skills of the business idea theme (creativity, comprehending difference skill, guessing skill, work plan skill, workplace design skill), sample activities were designed in accordance with these objectives by taking developmental processes and grade levels of the students into consideration. Three objectives and the activities designed related to these objectives were given in Table 2 below.

Table 2. *The second grade's objectives and activities related to the business idea theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.2.2.1. Geometric Shapes and Objects Terms or concepts: circle, cube, square prism, rectangle prism, triangle prism, sphere, cylinder M.2.2.1.2. Constructs structures using shape models, draws the structures constructed. a) Firstly, students will be able to work with one type of shape models and then make different studies using different shape models. b) Students will be able to realize the ornaments in the works of arts belonging to different civilizations.	Creativity, Comprehending Difference Skill/ Sample Activity a) Design a toy car using square, rectangular and circle shapes. b)  Which shapes are included in the Seljuk Star in the Seljuk Architecture above?
M.2.2.2. Spatial Relations Terms or concepts: symmetrical shape M.2.2.2.1. Uses mathematical language to indicate location, direction and movement. a) Mathematical language is used to define position, direction and motion along a line.	Workplace Design Skill, Guessing Skill / Sample Activity Following the right side of the school, a playground will be established in the area encountered when you turn right from the first distance. Which option is the correct location of the playground?  a) b) c)
M.2.3.3. Time Measurement M.2.3.3.1. Reads and shows the hour, half hour and quarter hour. a) Examples of time use over 24 hours are given. b) The terms of the hours, before noon, afternoon, morning, noon, evening and midnight are used. c) Analog and digital clocks are used together.	Work Plan Skill, Guessing Skill / Sample Activity  According to the time table given above, write down what you can do during the day at the given times.

As a result of examination of third grade's objectives, only 1 learning domain (measurement) and 2 objectives that can be facilitated to develop entrepreneurship skills related to business idea were found. In line with these objectives, in order to gain the sub-skill of the business idea theme, namely workplace design skill, sample activities were designed in accordance with found objectives by taking developmental processes and grade levels of the students into consideration. The objectives and the activities designed related to these objectives were given in Table 3 below.

Table 3. *The third grade's objectives and activities related to the business idea theme*

Learning Domain/ Objectives	Sample Entrepreneurship Skills/ Sample
M.3.3.2. Perimeter Measurement Terms or concepts: circumference M.3.3.2.1. Measures the perimeter of objects. M.3.3.2.3. Calculates the perimeter of the shapes. a) The perimeter of the shapes formed by square, rectangular or combination of these figures, given on the geometry board, dotted or squared paper are studied.	Work Plan Skill \ Sample Activity **1.**  Starting from corner A, the vehicle will move back to corner A following the arrows shown. What is the total distance travelled by the vehicle? **2.**  The distance between each point is 1 unit as given. What is the perimeter of abcd?

Lastly, 4th Grade Mathematics Curriculum was examined according to the business idea. As a result, only 1 objective related to the learning domain of "measurement" was found that can be facilitated to develop entrepreneurship skills related to business idea. In line with this finding, in order to gain the work plan skill of the business idea theme, a sample activity was designed in accordance with found objective by taking developmental processes and grade levels of the students into consideration. Related objective and activity were given in Table 4 below.

Table 4. *The fourth grade's objectives and activities related to the business idea theme*

Learning Domain/ Objectives	Sample Entrepreneurship Skills/ Sample
M.4.3.4. Time Measurement Terms or concepts: hours (hr.), minutes (min.), seconds (sec.) M.4.3.4.1. Explains the relationship between time measurement units. a) Converts between hour-minute and minute-second. b) Converts year-month-week, month-week-day	Work Plan Skill \ Sample Activity 1) Ali aimed to read a story book in 4 days, 6 hours and 15 minutes. Accordingly, how many seconds will Ali read this book? 2) Ayşe collects 5 liras a day to buy coat. If the coat she wants to buy is 305 pounds, how long can Ayşe save this money?

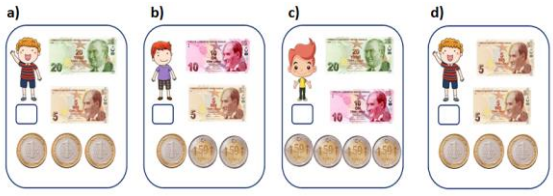
As a result, the investigation of the Primary School Mathematics Curriculum according to the business idea theme of entrepreneurship education revealed that the activities that can be designed to gain aimed skills were related to 3 learning domains (numbers-operations, measurement and data analysis) and 3 objectives at the first grade level, 2 learning domains (geometry and measurement) and 3 objectives at the second grade level, 1 learning domain (measurement) and 2 objectives at the third grade level and 1 learning domain (measurement) and 1 objective at the fourth grade level. Moreover, in total, it was obtained that 4 sub-skills within the business idea dimension could be gained through activities, namely workplace design skill, business plan skill, comprehending difference skill and creativity.

3. 2. Evaluation of Primary School Mathematics Curriculum according to finance dimension of entreneurship education

The activities related to gaining entrepreneurship skills in the Primary School Mathematics Curriculum are designed according to the dimensions of entrepreneurship education and under this title, the finance dimension determined as the second process is included. The finance dimension is important in finding necessary resources and capital for the realization of the business idea. Formation of business idea is one of the most important steps in realizing an entrepreneurial activity. In this process, it is aimed to develop skills of students related to obtaining factors (money, data, raw materials, etc.) for realizing their business idea and how to use these factors (Tarhan, 2019a). Therefore, taking the objectives of the Primary School Mathematics Curriculum into the consideration, in order to gain aimed skills in the entrepreneurship education with the activities, sample activities developed related to the sub-skills of entrepreneurship education were given in related tables according to the grade levels.

At the first step, the objectives of first grade were investigated and it was found that 2 learning domains (numbers-operations and measurement) and 2 objectives that can be facilitated to develop entrepreneurship skills related to finance dimension. In line with these findings, in order to gain the sub-skills of the finance dimension (calculating cost skill, resource analysis skill, awareness of finance support skill), sample activities were designed in accordance with the objectives by taking developmental processes and grade levels of the students into consideration. Related objectives and activities were given in Table 5 below.

Table 5. *The first grade's objectives and activities related to the finance theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.1.1.2. Addition with Natural Numbers. Terms or concepts: addition, sum, congregates, equal, plus M.1.1.2.1. Understands the process of addition. a) The meanings of the addition process, bringing together and adding the same type of objects, (collectible ones) are realized by modeling studies. b) Studies on daily life situations which have the meaning of addition are included.	<u>Calculating Cost Skill / Sample Activity</u> 1) We need 5 kg strawberries to make 1 jar of strawberry jam. If we have 3 kg of strawberries, what do we need to add to the ingredients to make 1 jar of jam? a) 2 kilos of apples b) 2 kilos of bananas c) 2 kilos of strawberries d) 3 kilos of strawberries
M.1.3.2. Money Terms or concepts: Turkish Lira (TL), kurus (kr.) M.1.3.2.1.Recognizes our money. a) Money of 1, 5, 10, 25, 50 kurus and 1, 5, 10, 20, 50 lira are familiarized. b) The needs that can be met with familiarized money are studied.	<u>Resource Analysis Skill / Sample Activity</u> (Awareness Of Finance Support Skills) 1) Which one is the student who saved 32 pounds to build a cat club?  2) Which of the following bags can Elif take if she has 16 liras? 

In the second grade, on the other hand, 3 learning domains (numbers-operations, measurement and data analysis) and 4 objectives that can be facilitated to develop entrepreneurship skills related to finance were found. In line with these objectives, in order to gain the sub-skills of the finance theme (calculating cost skill, resource analysis skill, awareness of finance support skill, income-expense control skill), sample activities were designed in accordance with these objectives by taking developmental processes and grade levels of the students into consideration. Four objectives and the activities designed related to these objectives were given in Table 6 below.

Table 6. *The second grade's objectives and activities related to the finance theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.2.1.1.Natural Numbers Terms or concepts: digit, digit value, number pattern, deck, dozen M.2.1.1.6. Recognizes the fixed number patterns, finds the rule of the pattern and completes the pattern by identifying the missing item. a) The difference between the elements of the pattern is noticed before the rule of the given number patterns is found. b) Number patterns with no more than two elements are used.	Calculating Cost Skill / Sample Activity 1) The market transition of a tomato is given in the following diagram.  According to the pattern given above, what is the cost of tomato in the third picture?
M.2.1.2. Addition with Natural Numbers. Terms or concepts: regrouping M.2.1.2.1. Adds and regroups with natural numbers up to 100 (including 100) in total a) Addition with two and three numbers whose sum does not exceed 100 are studied.	Calculating Cost Skill / Sample Activity (Awareness of finance support skill)  1) His father gave 15 TL, his grandfather 26 TL and his aunt 35 TL to Ahmet to throw in his piggy bank. Accordingly, how much will Ahmet throw in his piggy bank?
M.2.3.2. Money M.2.3.2.1. Notices the relationship between kurus and lira. a) For example, ten 10 kurus, four 25 kurus, two 50 kurus are equal to 1 lira. b) Decimal notations are not included. c) 100 and 200 TL are familiarized.	Resource Analysis Skill/ Sample Activity (Awareness of finance support skills) 1) How many liras does Funda have if she has ten 10 kurus, four 25 kurus, two 50 kurus and two 1 lira? a.)  b.)  b.)  d.) 

M.2.4.1. Data Collection and Evaluation Terms or concepts: scoreboard table, frequency table, object chart, figure chart, tree chart M.2.4.1.1. Gathers and classifies data by asking questions about any problem or subject, organizes data in the form of tree chart, scoreboard or frequency table; creates object and figure chart.	Income-Expense Control Skill / Sample Activity 1) 1) In a class, 8 people like plums, 12 people like bananas, 10 people like apples and 4 people like apricots. Accordingly, create a scoreboard of the fruits that this class loves. Table: Favorite Fruit Types Fruit Name | Number of Students Plums | Banana | Apple | Appricot |

As a result of examination of third grade's objectives, 2 learning domains (numbers-operations and measurement) and 6 objectives that can be facilitated to develop entrepreneurship skills related to finance theme were found. In line with these objectives, in order to gain the sub-skills of the finance theme (controlling income-expense skill, analyzing needs skill, calculating costs skill) sample activities were designed in accordance with these objectives by taking developmental processes and grade levels of the students into consideration. Related objectives and activities were given in Table 7 below.

Table 7. *The third grade's objectives and activities related to the finance theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.3.1.2. Addition with Natural Numbers M.3.1.2.6. Solves problems that require the addition of natural numbers. a) Problems that require at most three operations are included in problem solving. b) Problem-posing activities that require a maximum of two processes are also included.	Income-Expense Control Skill / Sample Activity 1) Tradesman Ömer has monthly expenses of electricity, water and meal, respectively 40, 200 and 300 liras. Accordingly, what is the total expense of tradesman Ömer in a month?
M.3.1.3. Subtraction with Natural Numbers M.3.1.3.4. Solves problems that require the addition and subtraction of natural numbers. a) Problems that require at most three operations are included in problem solving. b) Problem-posing activities that require a maximum of two processes are also included	Income-Expense Control Skill / Sample Activity 1) Monthly income of a toy repairman is 900 TL. Since this repairman has spent 150 TL for the tools and 100 TL for rent per month, how much money does this toy repairman earn per month?

M.3.3.4. Money

M.3.3.4.1. Shows the relationship between lira and kurus.
a) For example 325 kurus is expressed as 3 liras and 25 kurus.
b) Decimal notation is not included.

M.3.3.4.2. Solves problems related to our money.
a) Emphasis is placed on the importance of saving in problems.

Resource and Support Finance Skill/ Sample Activity
(Analyzing needs skill)
1)

Total Money (TL)	Needs	Price (TL)
	**Chandelier** 	**24 TL 50 Kurus**
	Carpet 	**70 TL 50 Kurus**
	Coffee table 	**100 TL**
	Armchair 	……

The total money and needs of the Uysal family who moved to a new house are shown in the table above. Accordingly, how much money should Uysal family spend for the armchair?

M.3.3.6. Weight
Terms or concepts: gram (g)

M.3.3.6.1. Measures objects in grams and kilograms.

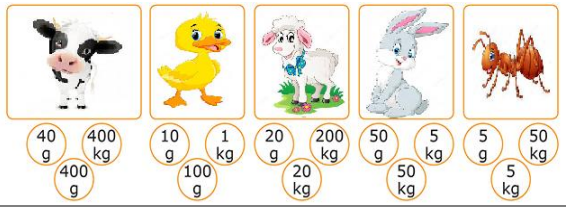
M.3.3.6.2. Estimates the mass of an object and checks its accuracy by measuring.

Calculating Cost Skill / Sample Activity

1) 300 kg meat bought to a restaurant. 125 kg and 103 kg consumed in the first and second week, respectively. Accordingly, how many kg of meat is left?

a) 125kg b) 103 kg c) 72 kg d) 85kg

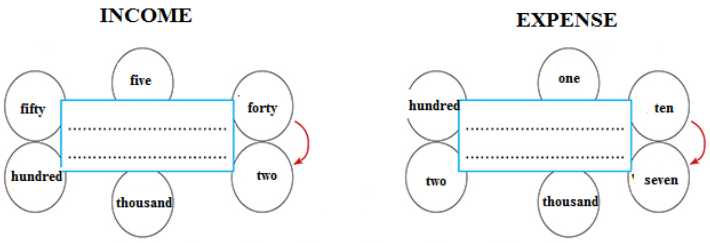
2) Find and mark the estimated mass of the images given below.



Lastly, 4th Grade Mathematics Curriculum was examined according to the finance theme. As a result, 5 objectives related to 3 learning domains (numbers-operations, measurement and data analysis) were found that can be facilitated to develop entrepreneurship skills related to finance theme. In line with this finding, in order to gain the skills of controlling income-expense, calculating costs the finance theme, sample activities were designed in accordance with these objectives by taking developmental processes and grade levels of the students into consideration. Related objective and activity were given in Table 8 below.

Table 8. *The fourth grade's objectives and activities related to the finance theme*

Learning Domain/ Objectives	Sample Entrepreneurship Skills/ Sample
M.4.1.1. Natural Numbers Terms or concepts: division M.4.1.1.1. Reads and writes 4, 5 and 6 digited natural numbers.	Income-Expense Control Skill/ Sample Activity 1)



The numbers starting from the arrow direction above indicate the income-expense status of an enterprise. Accordingly, what are the income and expense values of this business?

M.4.3.5. Weight
Terms or concepts: ton (t), milligram (mg)

M.4.3.5.3. Specifies the contexts where ton and milligram are used. Notations of tone and milligram are studied by using abbreviation

Calculating Cost Skill / Sample Activity

1) The list of materials needed in an enterprise is given below. Mark the weight types for which the given materials can be measured.

M.4.3.6. Liquid Measurement
Terms or concepts: milliliters (mL)

M.4.3.6.1. Explains the contexts milliliter used.
Examples of the most commonly used contexts and situations in daily life are given.

M.4.3.6.2. Explains the relationship between liter and milliliter and converts each other.
Decimal notation is not used.

Calculating Cost Skill / Sample Activity

1) Which liquid measurement units should be preffered for the liquid materials given below?

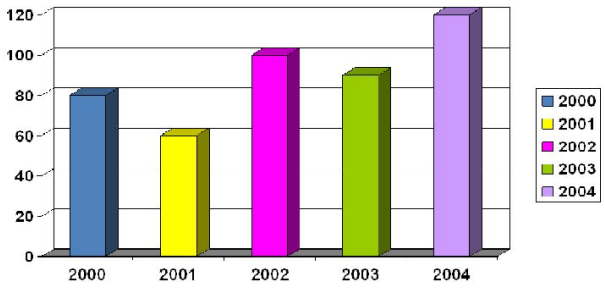
a) Liters- Milliliters- Liters- Milliliters
b) Milliliters- Liters- Milliliters- Liters
c) Liters - Milliliters - Milliliters - Liters
d) Milliliters- Milliliters- Liters- Liters

M.4.4.1. Data Collection and Evaluation
Terms or concepts: column chart

M.4.4.1.1. Examines the column graph, makes comments and predictions on the graph.

Income-Expense Control Skill / Sample Activity

1) The following column chart shows the number of workers employed by a factory in years of 2000, 2001, 2002, 2003 and 2004.



W

hich of the following is true according to the graph?
a) Minimum recruitment was realized in 2003.

	b) In 2000, 60 workers were employed in the factory c) The highest number of workers was realized in 2004 and 120 workers were employed. d) After 2002, recruitment of workers increased continuously.

As a result, the investigation of the Primary School Mathematics Curriculum according to the finance theme of entrepreneurship education revealed that the activities that can be designed to gain aimed skills were related to 2 learning domains (numbers-operations and measurement) and 2 objectives at the first grade level, 3 learning domains (numbers-operations, measurement and data analysis) and 4 objectives at the second grade level, 2 learning domains (numbers-operations and measurement) and 6 objectives at the third grade level and 3 learning domains (numbers-operations, measurement and data analysis) and 5 objectives at the fourth grade level. Moreover, in total, it was obtained that 5 sub-skills within the finance dimension could be gained through activities, namely calculating cost skills, resource analysis skills, awareness of financial support skills, controlling income-expense skills and analyzing needs skills.

3. 3. Evaluation of Primary School Mathematics Curriculum according to product design and production dimension of entreneurship education

The activities related to gaining entrepreneurship skills in the Primary School Mathematics Curriculum are designed according to the dimensions of entrepreneurship education and thirdly, product design and production dimension are discussed. The product design and production dimension includes the studies on the design and prototype of the product after obtaining financial support for the realization of the business idea. This stage is important for students to realize products or services that can bring their original ideas to life and reflect this process to problem situations during the process of entrepreneurship education (Tarhan, 2019a). Therefore, in order to gain aimed skills of the product design and production theme with the activities, sample activities designed related to the sub-skills of entrepreneurship education were given in related tables according to the grade levels.

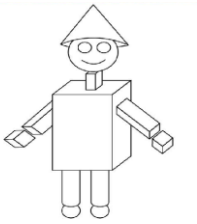
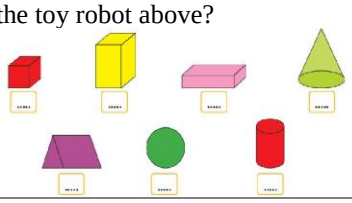
At the first step, the objectives of first grade were investigated and it was found that only 1 objective related to the learning domain of "geometry" was found that can be facilitated to develop entrepreneurship skills related to the product design and production theme. In line with this finding, in order to gain the product design skill of the theme, a sample activity was designed in accordance with the objective by taking developmental processes and grade levels of the students into consideration. Related objective and activity were given in Table 9 below.

Table 9. *The first grade's objectives and activities related to the product design and production theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.1.2.1. Geometrical Shapes and Objects Terms or concepts: side, corner, triangle, square, rectangle, circle M.1.2.1.2. Classifies simple objects used in daily life according to their properties and associates them with geometric shapes. a) The objects to be used are chosen from geometric objects. b) The properties related to classification (round, angular, rectangular, etc.) of the objects such as boxes, unit cubes, pet bottles, camping tents, ping-pong balls are listed without geometric objects (prism, sphere, etc.) being named. c) Different structures are created by using simple objects from daily life.	<u>Product Design Skill /Sample Activity</u> 1) İpek will design a toy for school activities. For this purpose, it is necessary to separate the round and square toys from the toy basket. Please help Ipek fort his job! 

As a result of examination of second grade's objectives, only 1 learning domain (geometry) and 1 objective that can be facilitated to develop entrepreneurship skills related to product design and production theme were found. In line with these findings, in order to gain the sub-skills of the product design and production theme, namely product design skill and innovative thinking skill, one sample activity was designed in accordance with the objective by taking developmental processes and grade levels of the students into consideration. The objective and related activity designed were given in Table 10 below.

Table 10. *The first grade's objectives and activities related to the product design and production theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.2.2.1.Geometrical Shapes and Objects Terms or concepts: circle, cube, square prism, rectangular prism, triangular prism, sphere, cyclinder M.2.2.1.2. Forms structures using shape models and draws the structures created. a) Firstly, students will be able to work with one kind of shape models and then they will work with different shape models. b) Drawing activities can be done on the dotted paper with the shapes obtained by using the surfaces of the objects. c) Students will be able to realize the ornaments in the works of art belonging to different civilizations.	<u>Product Design Skill, Innovative Thinking Skill /Sample Activity</u> 1)  Which of the following figures were used to design the toy robot above? 

Lastly, 4th Grade Mathematics Curriculum was examined according to the product design and production theme. As a result, only 1 objective related to the learning domain of "measurement" was found that can be facilitated to develop entrepreneurship skills related to this theme. In line with this finding, in order to gain the product design skill, a sample activity was designed in accordance with found objective by taking developmental processes and grade levels of the students into consideration. Related objective and activity were given in Table 11 below.

Table 11. *The first grade's objectives and activities related to the product design and production theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.4.3.1. Length Measurement Terms or concepts: millimeters (mm) M.4.3.1.2. Explains the relationship between length measurement units and writes the units in terms of each other. a) It is limited to binary conversions between millimeters-centimeters, centimeters-meters and meters-kilometers. b) Conversions that require the use of decimal notation are not included.	<u>Product Design Skill /Sample Activity</u> 1)  How many shelves will a carpenter create using a 12 m board by dividing it into 100 cm racks?

As a result, the investigation of the Primary School Mathematics Curriculum according to the product design and production theme of entrepreneurship education was revealed that the activities that can be designed to gain aimed skills were related to 1 learning domain (geometry) and 1 objective at the first grade level, 1 learning domain (geometry) and 1 objective at the second grade level and 1 learning domain (measurement) and 1 objective at the fourth grade level. However, any objectives at the third

grade level could not be related the product design and production theme of entrepreneurship education. Similarly, at other grade levels, it was observed that associated learning domains (geometry and measurement) and objectives were limited. On the other hand, the skill that can be associated with the objectives of the curriculum emerged as the product design skill and innovative thinking skill only.

3. 4. Evaluation of Primary School Mathematics Curriculum according to promotion-marketing dimension of entreneurship education

The activities related to gaining entrepreneurship skills in the Primary School Mathematics Curriculum are designed according to the dimensions of entrepreneurship education and findings related to promotion-marketing dimension are discussed under this title. The promotion and marketing process is considered important in terms of communicating the distinctive features of the product to people and reaching the target market audience as a result of the original design and production of the prototype (Tarhan, 2019a). On the other hand, it is important for students to gain skills about how to introduce their realized entrepreneurial ideas and their products and services. Therefore, in order to gain aimed skills of the promotion-marketing theme with the activities, sample activities designed related to the sub-skills of entrepreneurship education were given in related tables according to the grade levels.

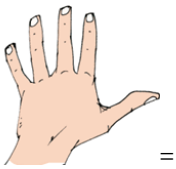
Firstly, the objectives of first grade curriculum were investigated and it was found that only 1 objective related to the learning domain of "geometry" was found for developing entrepreneurship skills related to the promotion-marketing theme. In line with these findings, in order to gain the sub-skills of the promotion-marketing (identifying and promoting the product skill), a sample activity was designed in accordance with found objective by taking developmental processes and grade levels of the students into consideration. Related objective and activity were given in Table 12 below.

Table 12. *The first grade's objectives and activities related to the promotion-marketing theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.1.2.1. Geometrical Shapes and Objects Terms or concepts: side, corner, triangle, square, rectangle, circle M.1.2.1.2. Classifies simple objects used in daily life according to their properties and associates them with geometric shapes. a) The objects to be used are chosen from geometric objects. b) The properties related to classification (round, angular, rectangular, etc.) of the objects such as boxes, unit cubes, pet bottles, camping tents, ping-pong balls are listed without geometric objects (prism, sphere, etc.) being named. c) Different structures are created by using simple objects from daily life. d) Expansion of geometric objects is not included.	<u>Identifying and Promoting The Product Skill /Sample Activity</u> Orhan and his friends designed the camping tent given below. Accordingly, which of the following explanations regarding the design of the tent is correct?  Unlike other tents, the camping tent is formed of square and triangular shapes. a) Unlike other tents, the camping tent is formed of a round and rectangular shape. b) Unlike other tents, the camping tent is formed of a round and square shape. c) Unlike other tents, the camping tent is formed of a rectangular shape.

As a result of examination of third grade's objectives, only 1 learning domain (measurement) and 2 objectives that can be facilitated to develop entrepreneurship skills related to promotion-marketing theme were found. In line with these findings, in order to gain the sub-skill of the product design and production theme, namely creating marketing plan skill, two sample activities were designed in accordance with the objective by taking developmental processes and grade levels of the students into consideration. Related objective and the activities were given in Table 13 below.

Table 13. *The third grade's objectives and activities related to the promotion-marketing theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.3.3.1. Length Measurement Terms or concepts: kilometers (km) M.3.3.1.1. Defines and uses non-standard measuring tools for one meter, half meter, 10 cm and 5 cm. Students are required to define physical and non-physical measurement tools such as rope, wire and pencil such as strokes, steps and spans and to perform different measurement activities using them.	Creating Marketing Plan Skill/ Sample Activity A span of Tailor Hatice is 10 cm. Since she measures the fabric of the dress to be sewn as 10 times of her span, how many cm is the fabric of the dress to be sewed?  = 10 cm
M.3.3.1.4. Recognizes the kilometer, specifies the contexts of use and recognizes the relationship between kilometers and meters. Conversion between units is not included.	Creating Marketing Plan Skill/ Sample Activity 1) A salesman takes out to sell the apples he has collected. The first market is 100 meters away and the second market is 100 kilometers away. Which market should this salesman prefer to spend less fuel with? Why?

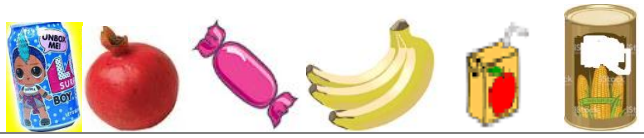
As a result, the investigation of the Primary School Mathematics Curriculum according to the promotion-marketing theme of entrepreneurship education revealed that the activities that can be designed to gain aimed skills were related to 1 learning domain (geometry) and 1 objective at the first grade level and 1 learning domain (measurement) and 2 objectives at the fourth grade level. It was obtained that 2 skills (identifying and promoting the product skills, product identification and creating marketing plan skills) can be gained through activities. However, any objectives at the second and fourth grade levels could not be related the promotion-marketing theme of entrepreneurship education. Similarly, at other grade levels, it was observed that associated learning domains (geometry and measurement) and objectives were limited.

3. 5. Evaluation of Primary School Mathematics Curriculum according to investment dimension of entreneurship education

Under this title, the investment dimension identified as the last process of entrepreneurship education is discussed. The investment dimension constitutes the final process of entrepreneurship education. Since this dimension has a feature that covers the whole process, it is important to gain the skills related to the realization of the business idea until this process. The investment dimension also includes factors related to production as building, human, equipment etc. to ensure product continuity (Tarhan, 2019a). Developing the planning and coordination skills of the students in this process is considered important. Therefore, in order to gain aimed skills of the investment theme with the activities, sample activities designed related to the sub-skills of entrepreneurship education were given in related tables according to the grade levels.

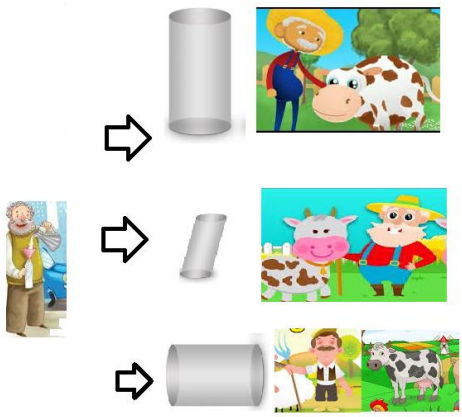
At the first step, the objectives of first grade were investigated and as a result, only 1 learning domain (geometry) and 1 objective that can be facilitated to develop entrepreneurship skills related to investment theme were found. In line with these findings, in order to gain the sub-skill of the investment theme (networking skill and workplace design skill), sample activities were designed in accordance with found objectives by taking developmental processes and grade levels of the students into consideration. The objectives and the activities designed related to these objectives were given in Table 14 below.

Table 14. *The first grade's objectives and activities related to the investment theme*

Learning Domain/ Objectives	Sample Entrepreneurship Skills/ Sample
M.1.2.1. Geometrical Shapes and Objects Terms or concepts: side, corner, triangle, square, rectangle, circle M.1.2.1.2. Classifies simple objects used in daily life according to their properties and associates them with geometric shapes. a) The objects to be used are chosen from geometric objects. b) The properties related to classification (round, angular, rectangular, etc.) of the objects such as boxes, unit cubes, pet bottles, camping tents, ping-pong balls are listed without geometric objects (prism, sphere, etc.) being named. c) Different structures are created using simple objects from daily life.	Networking Skill / Sample Activity (Workplace Design) 1) An artisan will collect the products packaged in the following sample jar product into a bag. Accordingly, which of the products in the scheme should enter this bag? **Sample of Jar** **Bag**   **The scheme:** 

Parallel to the findings of first grade, examination of second grade's objectives revealed that only 1 learning domain (geometry) and 1 objective that can be facilitated to develop entrepreneurship skills related to investment theme. In line with these findings, in order to gain the sub-skills of the investment theme, namely networking skill and problem identification and solving skill, one sample activity was designed in accordance with found objective by taking developmental processes and grade levels of the students into consideration. Related objective and activity were given in Table 15 below.

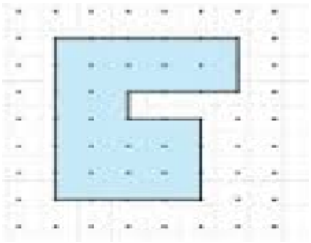
Table 15. *The second grade's objectives and activities related to the promotion-marketing theme*

Learning Domain/ Objectives	Sample Entrepreneurship Skills/ Sample
M.2.2.1.Geometrical Shapes and Objects Terms or concepts: circle, cube, square prism, rectangular prism, triangular prism, sphere, cyclinder M.2.2.1.4. Realizes that when the direction, position or size of geometric objects and shapes changes, their formal properties do not change. a) Familiarized shapes, objects and their properties are emphasized. b) Interactive studies with appropriate information and communication technologies may be included.	Networking Skill, Problem Identification and Solving Skill / Sample Activity  Farmer Emin ordered 10 liters of milk from three different farms. Three other farmers sent milk in cylindrical milk containers of different directions and sizes. Compare the formal characteristics of the cylinder milk containers.

At the third grade, 1 learning domain (measurement) and 1 objective that can be facilitated to develop entrepreneurship skills related to investment theme were found. In line with these findings, in order to

gain the sub-skills of the investment theme (networking skill, workplace design-sketch skill), a sample activity were designed in accordance with the objective by taking developmental processes and grade levels of the students into consideration. The objective and the activity designed related to this objective were given in Table 16 below.

Tablo 16. *The third grade's objectives and activities related to the promotion-marketing theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.3.3.2. Perimeter Measurement Terms or concepts: perimeter M.3.3.2.1. Determines the perimeter of objects. M.3.3.2.3. Calculates the perimeter of the shapes. a) The perimeter of the shapes formed from square, rectangular or a combination of these shapes given on the geometry board, dotted or squared paper are calculated. b) The perimeter of the circle is not calculated.	Networking Skill / Sample Activity (Workplace Design-Sketch Skill)  Trees will be planted around the workplace colored in blue above and the distance between points is 1 unity. What is the perimeter of this business?

Lastly, 4th Grade Mathematics Curriculum was examined according to the investment theme. As a result, only 1 objective related to the learning domain of "measurement" was found that can be facilitated to develop entrepreneurship skills related to the theme. In line with this finding, in order to gain networking skill and workplace design-sketch skill, a sample activity was designed in accordance with the objective by taking developmental processes and grade levels of the students into consideration. Related objective and activity were given in Table 17 below.

Tablo 17. *The fourth grade's objectives and activities related to the promotion-marketing theme*

Learning Domain/ Objectives	**Sample Entrepreneurship Skills/ Sample**
M.4.3.2. Perimeter Measurement M.4.3.2.1. Explain the relationship between the perimeter and side lengths of the square and rectangle. a) The relationship between perimeter and side lengths are examined with activities related to a rectangle whose perimeter or a side length is known or a square whose a side length is known. b) Students are found that the perimeter of a square is four times the length of one side.	Networking Skill / Sample Activity (Workplace Design-Sketch Skill)  The perimeter of the square garden with sheep above is 76 cm. Accordingly, what is the length of one side of this garden?

As a result, the investigation of the Primary School Mathematics Curriculum according to the investment theme of entrepreneurship education was revealed that the activities that can be designed to gain aimed skills were related to 1 learning domain and 1 objective at all grade levels. The learning domain was "geometry" at first and second grade levels whereas at other grade levels, related objectives were associated with the learning domain of "measurement". Moreover, in total, it was obtained that 2 sub-skills within the business idea dimension could be gained through activities, namely networking skill and workplace design-sketch skill.

3. Conclusion and Suggestions

In this research aiming to gain and develop entrepreneurial skills of students, Primary School Mathematics Curriculum of Turkey was examined. In this direction, the objectives of the program related to the entrepreneurial skills were determined and the activities were designed in line with these objectives. In this process, the findings and observations of the researchers based on the study's results and evaluations within the framework of entrepreneurship education are as follows:

It was determined that the activities prepared in order to gain entrepreneurship skills in the Primary School Mathematics Curriculum were not compatible with each grade level and each learning domain. This suggests that some of the objectives are not compatible for gaining entrepreneurship skills. Therefore, any activities could be designed related to objectives and learning domains at some of the grade levels. Moreover, among the skills thought to be important to gain within the scope of entrepreneurship education and listed in Appendix, any objectives and learning domains could be associated with those related to expressing business idea, seeing opportunities, cooperation, market analysis, resource analysis, brochure and logo design, advertising design, good speech and effective communication with customers, identifying promotions and management skills.

Based on this result, the activities designed for the business idea were limited to three learning domains (numbers-operations, measurement and data analysis) and 3 objectives at the first grade level; two learning domains (geometry and measurement) and 3 objectives at the second grade level; one learning domain (measurement) and 2 objectives at the third grade level and one learning domain (measurement) and 1 objective at the fourth grade level while the activities prepared for finance dimension were related to two learning domains (numbers- operations, measurement) and 2 objectives at the first grade level; three learning domains (numbers- operations, measurement, data analysis) and 4 objectives at the second grade level; three learning domains (numbers-operations, measurement) and 6 objectives at the third grade level and three learning domains (numbers-operations, measurement, data analysis) and 5 objectives at the fourth grade level. On the other hand, one learning domain (geometry) and 1 objective in the first grade; one learning domain (geometry) and 1 objective in the second grade, and one learning domain (measurement) and 1 objective in the fourth grade were determined related to the product design and production dimension. Moreover, it was determined that the promotion and marketing dimension was limited to one learning domain (geometry) and one objective at the first grade level, and one learning domain (measurement) and two objectives at the second grade level. Finally, one learning domain and 1 objective were related at all grade levels for the investment theme. The learning domain was "geometry" at first and second grade levels whereas at other grade levels, related objectives were associated with the learning domain of "measurement".

Another important result of the study is the lack of comprehensive studies related to entrepreneurship education in mathematics education. Since it has been determined that there were any studies in mathematics education involving the creation and application of mathematical activities by addressing entrepreneurship elements systematically (dimension, subject, skill, value). Therefore, obtained results of the study could not be discussed in line with other results.

This study was conducted to examine the Primary School Mathematics Curriculum of Turkey within the scope of the dimensions of entrepreneurship education and design sample activities. Therefore, it can be suggested that similar studies should be conducted to examine secondary and high school mathematics courses. Since this study is limited to the skills of Primary School Mathematics Curriculum, conducting different studies on knowledge and values that should be taught in entrepreneurship education process is thought to contribute to related literature. Moreover, examination of mathematics curriculum in different countries in this respect is thought to provide important contributions in terms of international applications of entrepreneurship education.

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Appendix

The Dimensions of The Entrepreneurship Education			
Dimensions	Themes	Skill	Value
Business Idea	• Creating a Business Idea by Getting Feedback from People Around Us • Establishing the Business Idea by Identifying the Needs of the Community, (Needs Analysis) • Creating a Business Idea by Using the Advantages of Place • Building a Business Idea by Asking People What They Are Interested in (Question Analysis) • Creating Business Idea in line with our Individual Skills	• Expressing Business Idea Skill, • Business Plan Skill, • Workplace Design Skill, • Guessing Skill, • Comprehending Difference Skill, • Creative Thinking Skill, • Innovative Thinking Skill, • Problem Solving Skill, • Cooperation Skill,	• Being Patient, • Having Self Confidence, • Being a Patriot, • Being Hard-working • Being Responsible • Being Able to Move Together
Finance	• Calculation of Cost • Resource and Support Finance • Sales Finance • Profit and Risk Finance	• Awareness of Financial Support Skill, • Control Income and Expense Skill, • Calculating Cost Skill, • Needs Analysis Skill, • Market Analysis Skill, • Resource Analysis Skill	• Being Generous, • Being helpful, • Being Responsible • Being patient, • Having Self Confidence, • Being Honest,
Product Design And Production	• Product Demand (Market) Research • Product design • Production / Cretion of Product's Prototype	• Product Design Skill, • Determination of Product Quality and Product Promotion Skill, • Brochure Design Skills, • Logo Design Skills, • Advertising Design Skills	• Personal Control (Self Control), • Being Sensitive (History, Environment and People), • Being Lovers (Love of Nation, Flag of Love),
Promotion and Marketing	• Market and Marketing Strategy • Introduction of Product Quality and Distinguishing Features • Advertising and Promotion	• Good Speaking and Effective Communication with Customers, • Creating a Marketing Plan Skill, • Defining the Market Skill, • Identify and Promoting the Product Skill, • • Advertising Design Skill, • Identifyıng Promotions Skill	• Being Hard-working • Being Reliable, • Having Self Confidence,
Invesment	• Workplace • Investment and Management • Research and Development Investments • Professional Investments (Customer, Personnel, Personal Development)	• Management Skills, • Networking Skills, • Problem Identification and Solving Skills	• Being Conscientious, • Being Tolerant, • Being merciful,